EFT of PNG with a spin
&
From YM theory to GR: The classical double copy

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ABSTRACT

1. EFT of PNG with a spin *The recent observations of GW signals emitted by coalescing black hole binaries reinforced the need to get hold of the analytical description of binary systems made of spinning objects at the inspiral phase by the post-Newtonian (PN) approximation of Gravity (PNG). We have entered a new era of high precision GW observations, for which PN corrections and their related gauge invariant observables are required to high orders. To this end, we present the main ideas of the Effective Field Theory (EFT) approach to the PN formalism of the binary inspiral problem, where we formulated an EFT for gravitating spinning objects. In particular, we present the complete framework, which we dub "EFT of PNG", also in terms of its useful automatization from the fundamental theory stages to the extraction of Hamiltonians, EOMs, and other gauge invariant observables, such as the binding energy, and the conserved integrals of motion.*

2. From Yang-Mills theory to GR: The classical double copy *In recent years powerful and intriguing duality and correspondence relations have been discovered in the context of scattering amplitudes in supergravity theories. The so called color-kinematics duality, and the related double copy correspondence, state that once written in a specific dual form, Yang-Mills amplitudes can be mapped onto their gravity theory counterparts by applying a prescribed set of color to kinematics replacement rules. Beyond the opportunity to reveal more on the underlying origin of these relations at the fundamental level of the theories, and thus improve our current understanding of gravity, this correspondence offers a compelling novel approach to handle perturbative (and exact) computations in classical gravity, and in particular also for BHs and GWs. We will present our first implementations of the classical double copy in gravity.*